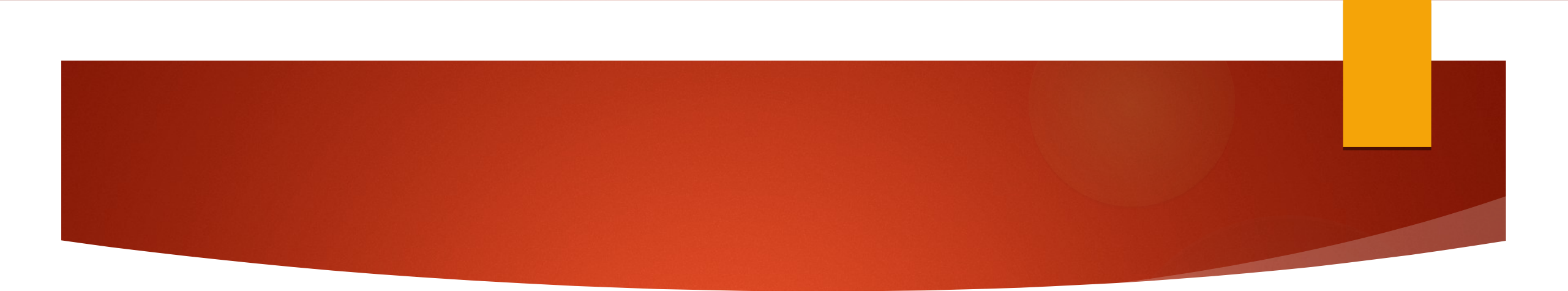




IT BTEC



Unit 2

Creating Systems to Manage Information

Today's Lesson

- ▶ What is a database?
- ▶ Knowing the difference between a flat file database and a relational database
- ▶ Determining a sensible structure for a database

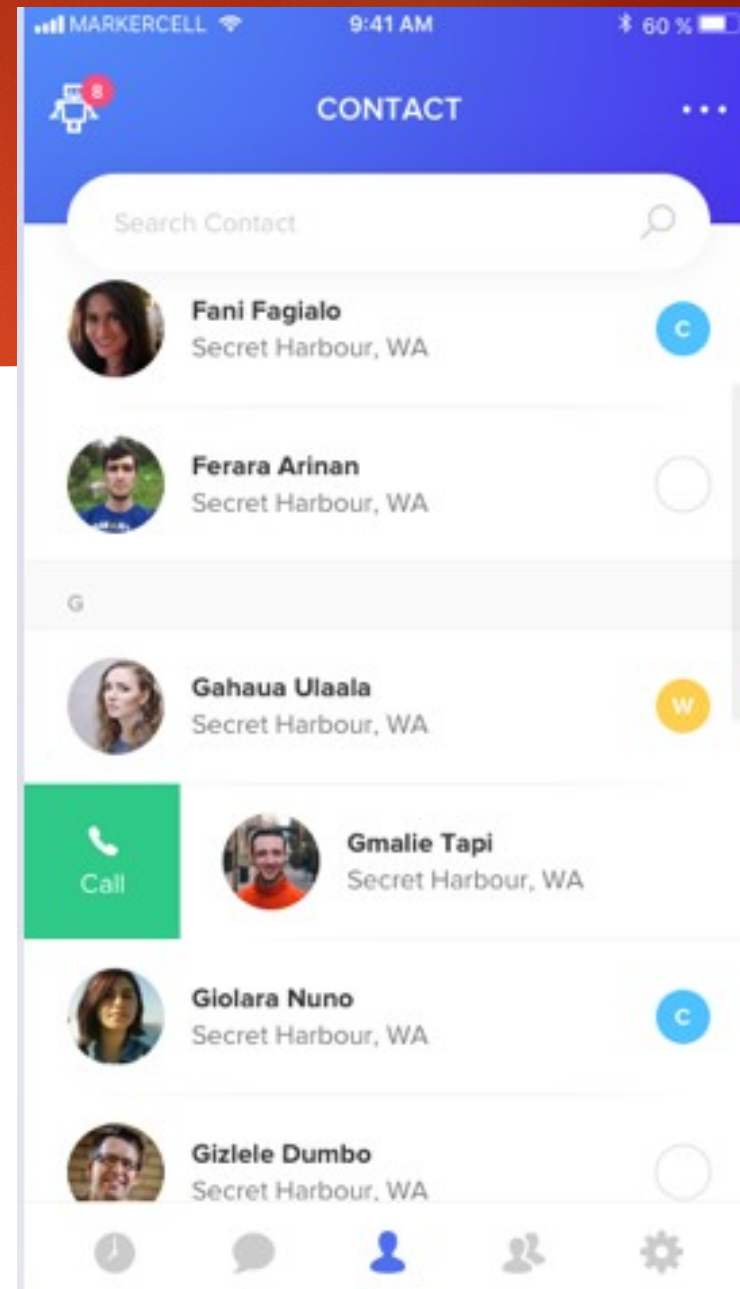
What is a Database?

- ▶ **Database** - a structured set of data held in a computer
- ▶ A database is a computerised system that makes it easy to search, select and store **information**. Databases are used in many different places.
- ▶ Your school might use a database to store information about attendance or to store pupils' and teachers' contact information. A database like this will probably be protected with a password to make sure that people's personal information is kept safe.
- ▶ Your library might also use a database to keep track of which books are available and which are on loan.

What is a Database?

- ▶ **Database** - a structured set of data held in a computer
- ▶ A database is a computerised system that makes it easy to search, select and store **information**. Databases are used in many different places.

What information is being stored in your Contacts?





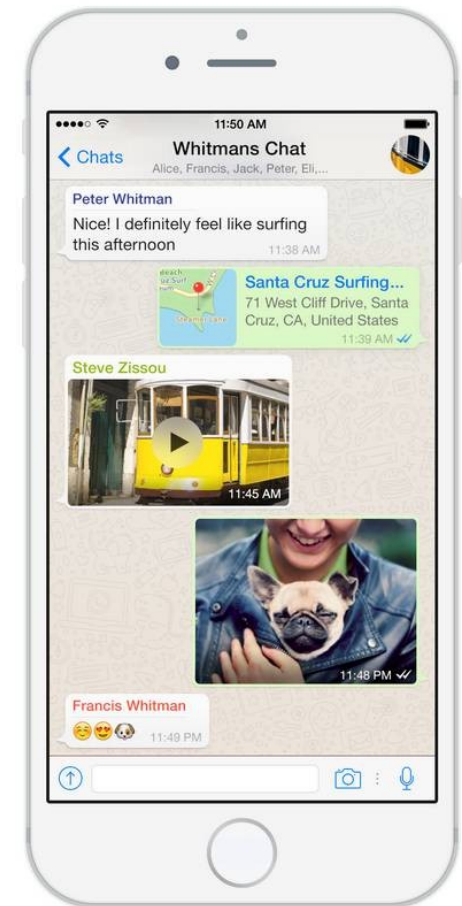
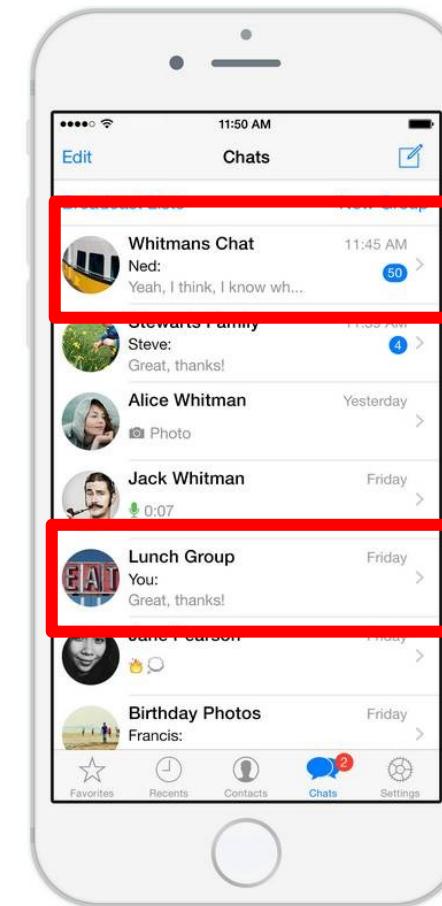
- ▶ **Database** - a structured set of data held in a computer
- ▶ A database is a computerised system that makes it easy to search, select and store **information**. Databases are used in many different places.

What might this database look like?





- ▶ **Database** - a **structured** set of data held in a computer
- ▶ A database is a computerised system that makes it easy to search, select and store **information**. Databases are used in many different places.



**Phone
Contacts**

Groups

**Phone
contacts
added to
groups**

What is a Database?

amazon

Sign-In

Email (phone for mobile accounts)

Password [Forgot your password?](#)

Sign-In

By continuing, you agree to Amazon's [Conditions of Use](#) and [Privacy Notice](#).

☐ Keep me signed in. [Details](#)

New to Amazon?

Create your Amazon account

amazon

Create account

Your name

Email

Password

amazon.com [SIGN IN](#) [SHIPPING & PAYMENT](#) [GIFT-WRAP](#) [PLACE ORDER](#)

Review Your Order

By placing your order, you agree to Amazon.com's [privacy notice](#) and [conditions of use](#)

Shipping Address:	Billing Information:	Gift Cards & Promotional Codes:
Chris Customer 742 EVERGREEN TERRACE SPRINGFIELD, WV 20025 United States Phone: 1234567890 Change	Rewards Points discover ending in 1234 Change Billing Address: Same as shipping address Change	<input type="text"/> Apply

Estimated delivery: Sept. 26, 2011

Apple iPad Camera Connection Kit (MC531ZM/A)
\$29.95
Prime
Quantity: 1 [Change](#)
Sold by: -Media-Mart
[Add gift options](#)

Choose your **Prime shipping speed:**

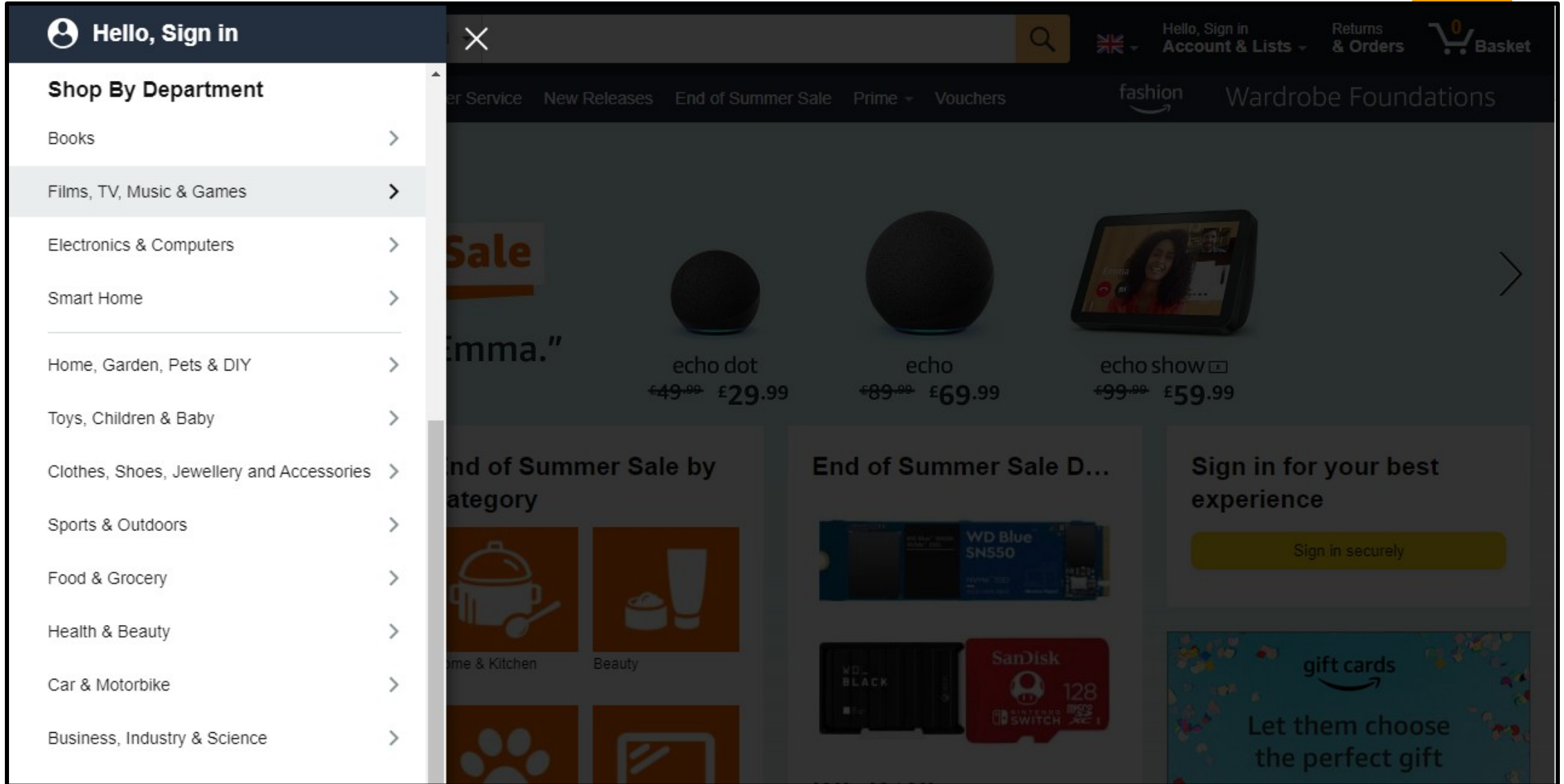
- ☐ FREE Standard Shipping (3-5 business days)
- ☒ FREE Two-Day Shipping **—get it Monday, September 26**
- ☐ \$3.99/item One-Day Shipping **—get it Saturday, September 24**

Place your order

Order Summary	
Items:	\$29.95
Shipping & Handling:	\$0.00
Total Before Tax:	\$29.95
Estimated Tax To Be Collected:	\$0.00
Rewards Points	-\$4.58
Order Total: \$25.37	

How are shipping costs calculated?
Amazon Prime Shipping has been applied to the eligible items in your order.

What information is stored in Amazon's database?



What is a Database?

What information is being stored in Amazon's Database?

- ▶ The customer's details – name, e-mail, password, address, payment details
- ▶ Customer purchases
- ▶ The products they sell – grouped in categories

**Customer
Details**

**Customer
Purchases**

**Amazon
Products**

Starter Activity

Search the internet for a '**database designer**' job.

What does a database designer do?

How much do they earn?

Extension: Look for a starter job – a junior role in database design.

Database Terminology

- **Field** - a piece of information related to a single person or thing (e.g. a student's name or ID in the student table)

[illegible]

Student Records Database

The screenshot shows a web browser displaying a student record for Jonathan Bloggs (1400016). The browser's address bar shows the URL: localhost/ProSolution/Pages/Student/Details/personal.aspx?academyyearid=3vb1v11X0_A&studentid=hTWdFD2tOAo. The page has a navigation menu with links like Home, Students, Offerings, Registers, Timetables, Exams, Reports, Other, Other Systems, and Help. The main content area is titled 'Bloggs, Jonathan (1400016) - Personal Details' and includes a dropdown for 'Academic Year' set to '18/19'. On the left, a sidebar lists various categories: Personal, Additional, Contact, Disability, Medical, User Defined, Data Protection, Enrolments, Attendance, Authorised Absence, Exams, Timetable, Quals on Entry, Fees, and Employment. The 'Personal' section is active, showing a student photo and a form with fields for Ref No, Surname, First Forename, Other Forenames, Known As, Title, Gender, Ethnic Group, Date Of Birth, Overseas, ULN, Nat Ins No, UCI Ref, EMA No, ALG No, SLC Ref No, Tutor, Tutor Group, Age On 31 Aug, and Mature. Below this, there are sections for 'Student Address' with 'Home Address' and 'Term Address' sub-sections, each containing 'Address' and 'Test' fields.

Bloggs, Jonathan (1400016) - Personal Details

Academic Year: 18/19

Personal

Additional

Contact

Disability

Medical

User Defined

Data Protection

Enrolments

Attendance

Authorised Absence

Exams

Timetable

Quals on Entry

Fees

Employment

Ref No: 1400016

Surname: Bloggs

First Forename: Jonathan

Other Forenames: Lee

Known As: Thomasz

Title: Mast

Gender: M

Ethnic Group: White - British

Date Of Birth: 24/02/2002

Overseas: ☐

Uln:

Nat Ins No:

UCI Ref:

EMA No:

ALG No:

SLC Ref No:

Tutor:

Tutor Group:

Age On 31 Aug: 16

Mature: ☐

Student Address

Home Address

Address: Test:

Address:

Term Address

Address:

Address:

100

Student ID 21001
Jack Smith,
33 High Street,
Dagenham,
Essex RM22 1BQ
Course ID 21656, Maths, Teacher Marion, Room B20
Course ID 21330, English, Teacher Rob, Room M11
Course ID 21885, History, Teacher Sally, Room L55

Course ID 21656, Maths, Teacher Marion, Room L55

[illegible]

Database Records

Add the following 'Records' to your 'Table'

Student ID 21003

Sahra Chan,
155 Maldon Close,
Hornchurch,
Essex RM14 1SS

Course ID 21959, Politics, Teacher Tony, Room B20

Course ID 21330, English, Teacher Rob, Room M11

Course ID 21211, ICT, Teacher Julie, Room B03

Student ID 21004

Lucy Jones,
64 Cross Drive,
Romford,
Essex RM19 2NF

Course ID 21959, Politics, Teacher Tony, Room R33

Course ID 21211, ICT, Teacher Julie, Room M11

Course ID 21656, Maths, Teacher Marion, Room L55

Relational Database

Student Details

**Student
Enrolment**

Course Details

Database Terminology

- ▶ **Database** - a structured set of data held in a computer
- ▶ **Flat file database** - this is a database of just one table. It can be created in database software or in a spreadsheet. An example might be a list of names and addresses.
- ▶ **Relational database** - A relational database organises data into **tables** which can be linked—or related—based on data common to each. This capability enables you to retrieve an entirely new table from data in one or more **tables** with a single query. This is used for more complex data – e.g. names and address + bookings or purchases.

Database Validation

- ▶ **Validation** is an automatic computer check to ensure that the data entered is sensible and reasonable. It does not check the accuracy of data.
- ▶ Types of validation:
 - Length check
 - Format Check
 - Range Check
 - Presence check
 - Value lookup (list)
- ▶ Validation is applied in the 'Properties' of each field in the database



Database Validation

Examples for your Student Enrolment Database

- ▶ Length Check – change the 'Field Size' property for each field to reflect the number of characters you would expect as a maximum
- ▶ Test that the validation works



The screenshot shows the 'Field Properties' dialog box with the 'General' tab selected. The 'Field Size' property is highlighted with a red rectangle and is set to 50. Other properties visible include Input Mask, Caption, Default Value, Validation Rule, Validation Text, Required (No), Allow Zero Length (Yes), Indexed (No), Unicode Compression (Yes), IME Mode (No Control), and IME Sentence Mode (None).

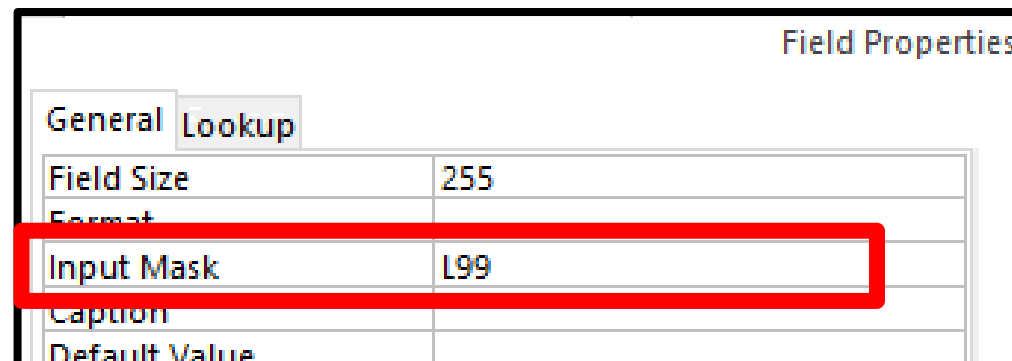
Field Properties	
Field Size	50
Input Mask	
Caption	
Default Value	
Validation Rule	
Validation Text	
Required	No
Allow Zero Length	Yes
Indexed	No
Unicode Compression	Yes
IME Mode	No Control
IME Sentence Mode	None

The maximum number of characters you can enter in the field. The largest maximum you can set is 255. Press F1 for help on field size.

Database Validation

Examples for your Student Enrolment Database

- ▶ Format Check – use the ‘Input Mask’ property for the Room Number field. Note that all room numbers have the same format – one letter and two numbers (e.g. B20)
- ▶ Input mask rule: Use the letter ‘L’ to specify that a letter must be entered and ‘9’ to specify that a digit must be entered.
- ▶ Test that it works



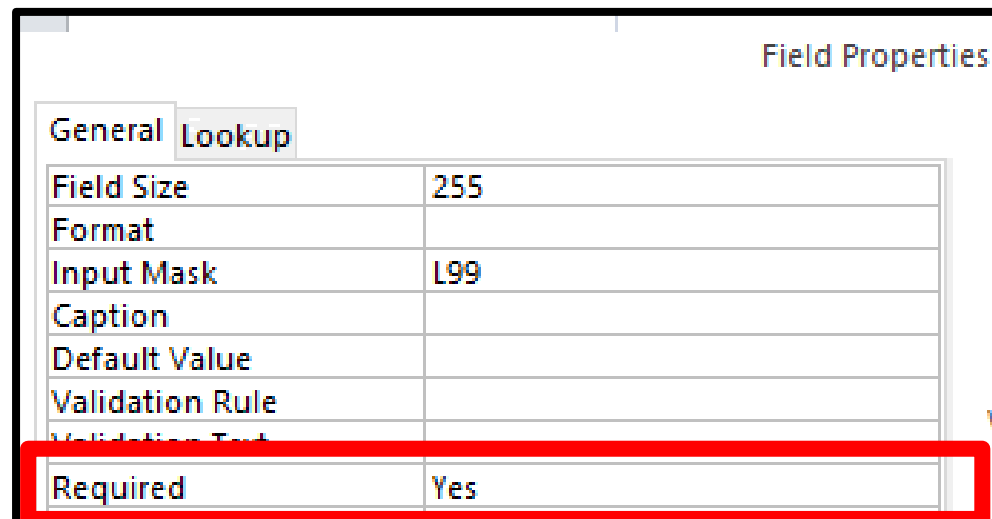
The screenshot shows the 'Field Properties' dialog box with the 'Lookup' tab selected. The 'Input Mask' property is highlighted with a red rectangle and is set to 'L99'. The 'Field Size' is set to 255. The 'Caption' and 'Default Value' properties are also visible.

Field Properties	
General	Lookup
Field Size	255
Format	
Input Mask	L99
Caption	
Default Value	

Database Validation

Examples for your Student Enrolment Database

- ▶ Presence Check – Use the 'Required' property – change it to 'yes' to specify that a field cannot be left blank – data must be entered
- ▶ Do this for the 'Room' field and test that it works



Field Properties

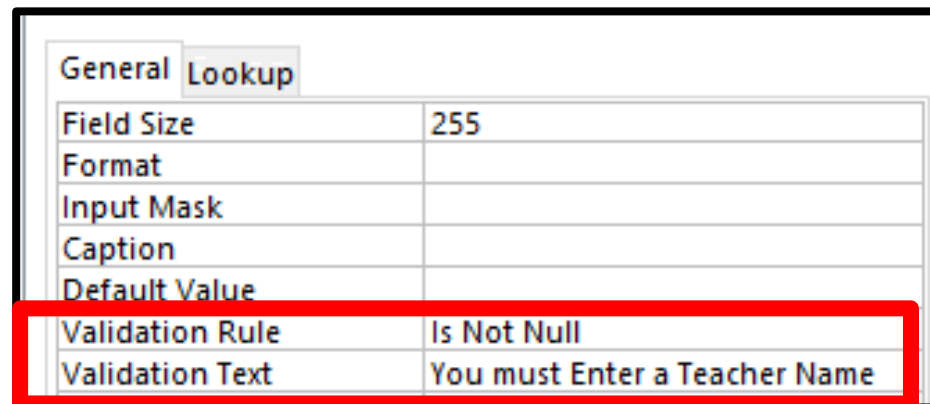
General Lookup

Field Size	255
Format	
Input Mask	L99
Caption	
Default Value	
Validation Rule	
Validation Text	
Required	Yes

Database Validation

Examples for your Student Enrolment Database

- ▶ Presence Check – an alternative way to do a presence check is through the 'Validation Rule' property
- ▶ You use the term 'Is Not Null'
- ▶ Do this for the 'Teacher' field and test that it works
- ▶ Note that for this property you also add 'Validation Text', which is a prompt for the user



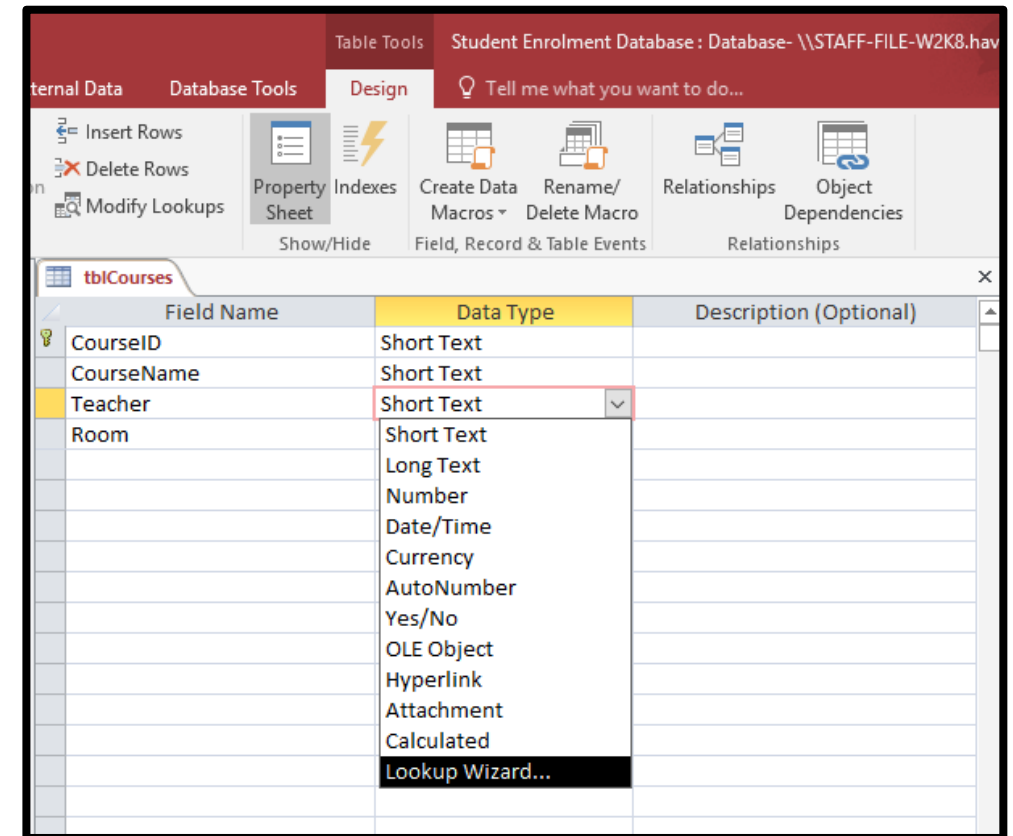
The screenshot shows a 'Lookup' tab in a database field properties window. The 'Validation Rule' is set to 'Is Not Null' and the 'Validation Text' is 'You must Enter a Teacher Name'. The 'Validation Text' is highlighted with a red box.

General Lookup	
Field Size	255
Format	
Input Mask	
Caption	
Default Value	
Validation Rule	Is Not Null
Validation Text	You must Enter a Teacher Name

Database Validation

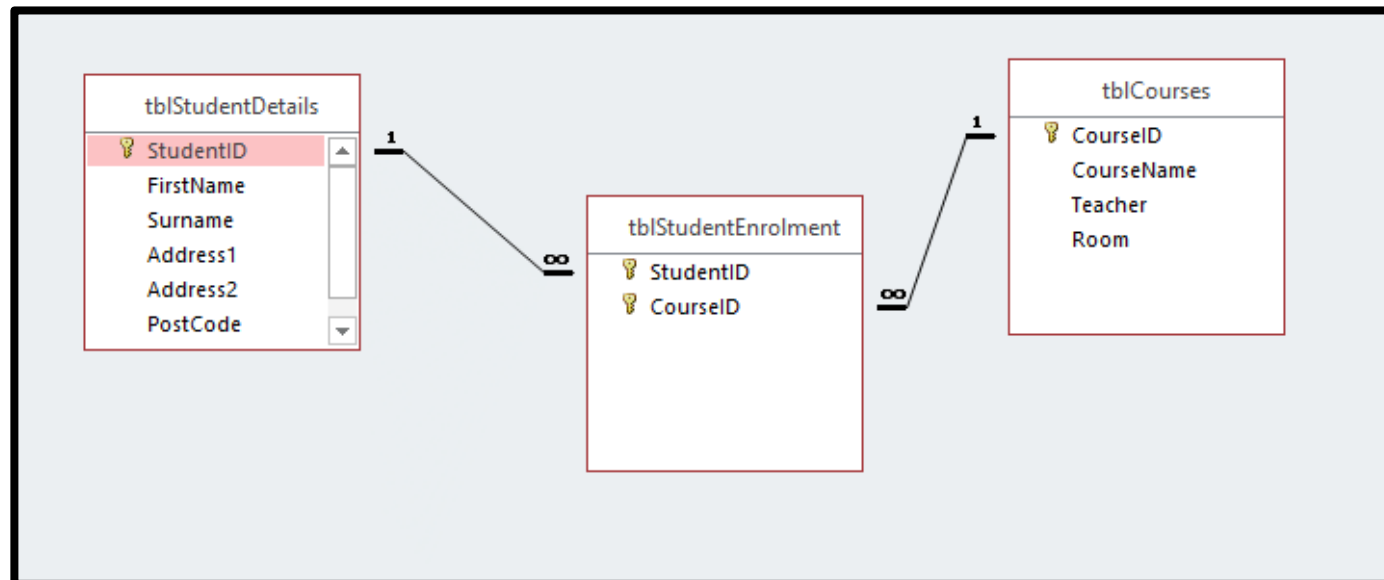
Examples for your Student Enrolment Database

- ▶ Value Lookup – You can use the 'Lookup' property to create a list to choose from, or alternatively you can do this through a wizard in the 'Data Type'
- ▶ Do this for the 'Teacher' field and test that it works
- ▶ Once you have used the wizard in the Data Type column, have a look at the syntax that is automatically created in the 'Lookup' property



Database Relationships

- ▶ Create relationships between the tables ('Database Tools', 'Relationships')
- ▶ Note that the data type for Student ID must be number in both tables – the same applies to Course ID.
- ▶ Linking the tables like this allows you to bring data together from multiple tables



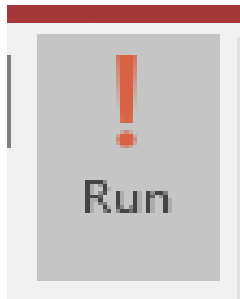
Entering Records (Test Data)

- ▶ Enter the student and course data again – this time in your Access database tables (copy from your flat file spreadsheet)

Database Queries

- ▶ You can search for information from all three tables by creating a 'Query' ('Create', 'Query Design').

Search for Jack Smith's address



Save the query

qryStudentAddress

tblStudentDetails

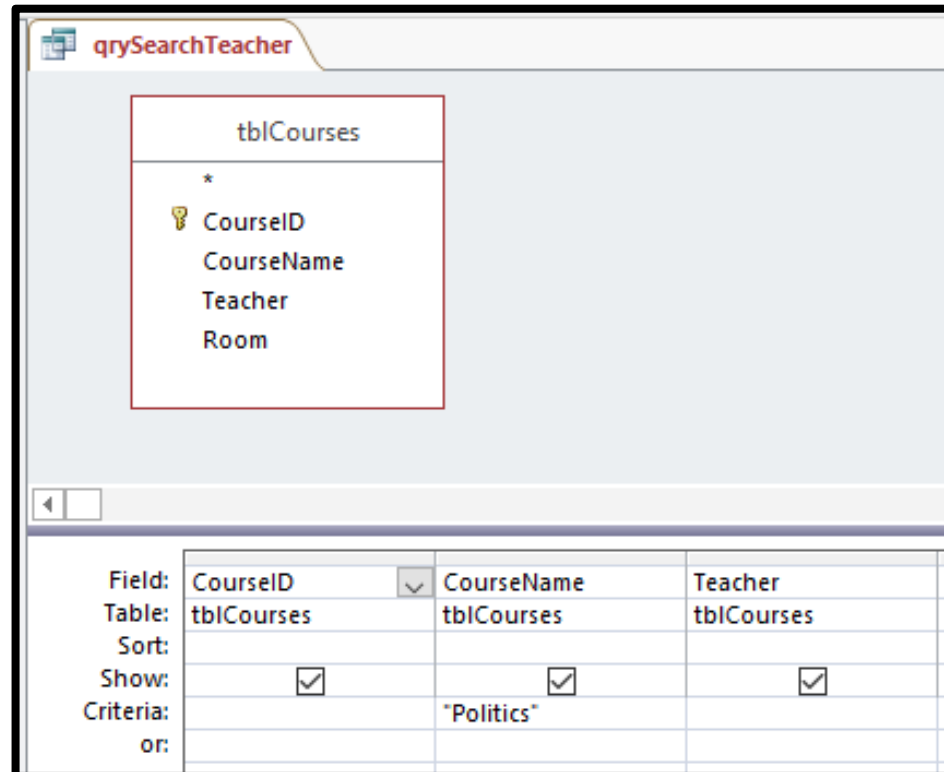
*

StudentID
FirstName
Surname
Address1
Address2
PostCode
Telephone

Field:	StudentID	FirstName	Surname	Address1	Address2	PostCode
Table:	tblStudentDetails	tblStudentDetails	tblStudentDetails	tblStudentDetails	tblStudentDetails	tblStudentDetails
Sort:						
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:		"Jack"	"Smith"			
or:						

Database Queries

- ▶ Search for the name of the Politics teacher
- ▶ Save the query



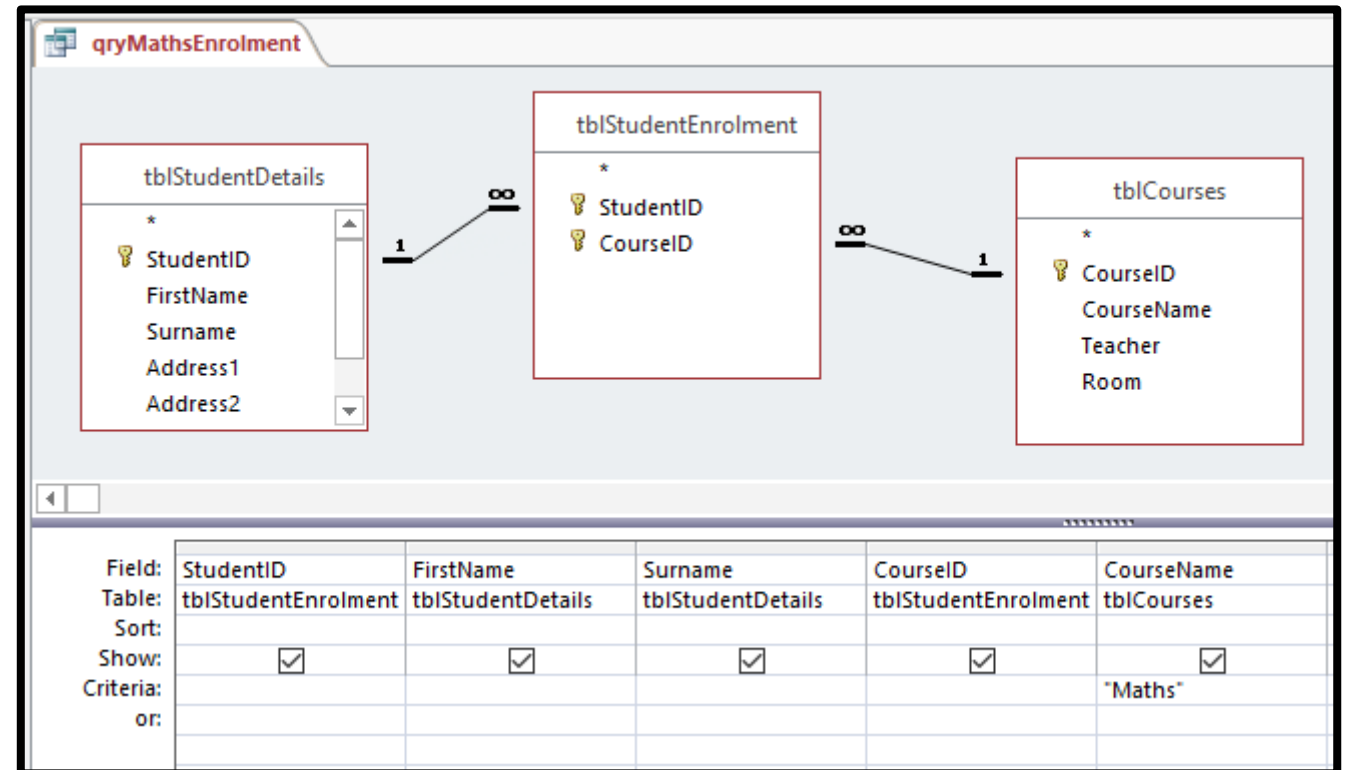
The screenshot shows the Microsoft Access query design view for a query named 'qrySearchTeacher'. The design grid is as follows:

Field:	CourseID	CourseName	Teacher
Table:	tblCourses	tblCourses	tblCourses
Sort:			
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:		"Politics"	
or:			



Database Queries

- ▶ Search for all students enrolled on Maths
- ▶ Save the query



Database Data Entry Form

- ▶ Database Designers try to make the database as easy as possible to use
- ▶ They create 'Forms' to make data entry easy
- ▶ You can join two tables together in one form
- ▶ It is important to have a good 'user interface'

The screenshot shows a Microsoft Access form titled "frmStudentEnrolment" with the main heading "Student Enrolment Form". The form contains several text boxes for data entry:

- StudentID (with a small icon)
- FirstName
- Surname
- Address1
- Address2
- PostCode
- Telephone

Below these fields is a table with a column header "CourseID" and a dropdown arrow. The first row of the table is marked with an asterisk (*). The table has multiple empty rows for data entry.

At the bottom of the form, there is a status bar with the following controls:

- Record: 1 of 1
- Navigation buttons (back, forward, etc.)
- No Filter
- Search button

Database Main Menu

- ▶ Database Designers will create a main menu to open different components of the database
- ▶ They build a 'User Interface'

Student Enrolment Database

New Student Enrolment

Find Student Address

Maths Enrolments